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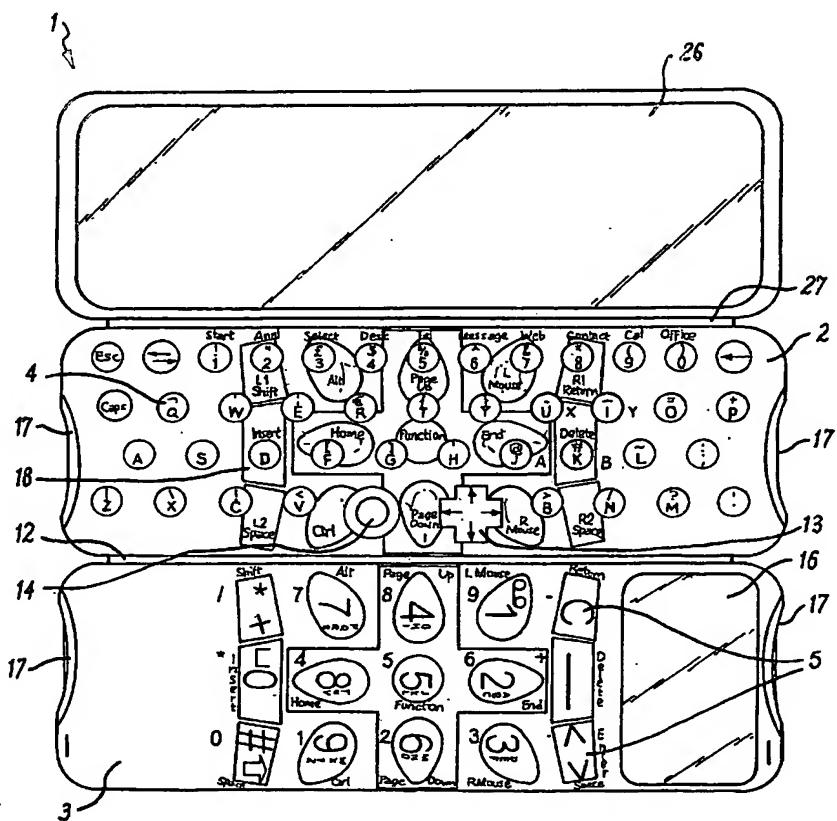
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[Continued on next page]

(54) Title: MINIATURISED KEYBOARD



(57) Abstract: A keyboard (1) that comprises for miniaturisation of the keyboard (1) while maintaining efficient use of the keyboard (1) by an operator is described. The keyboard (1) comprises a first keyboard section (2) that contains the character input keys (4) and a second independent keyboard section 3 that contains the usual command keys (5). The two keyboard sections are pivotally attached so that the keyboard (1) can be moved between an open desktop configuration and a closed, hand-held configuration. As a result the keyboard (1) is capable of being employed as a desktop keyboard, a hand-held keyboard. When configured as a hand-held keyboard the keyboard (1) may also be employed as a games controller, a mobile phone or as a remote control device.

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1 Miniatuerised Keyboard

2

3 The present invention relates to a keyboard. In  
4 particular, the invention relates to a keyboard that  
5 comprises a key layout that allows for miniaturisation  
6 while maintaining efficient use by a keyboard operator.

7

8 Over recent years there has been steady progress made in  
9 the art of miniaturising keyboards due to the continued  
10 miniaturisation of electronic components. These  
11 miniaturised keyboards find application in the fields of  
12 portable computers, mobile phones and electronic games  
13 controllers. Most of the keyboards for portable  
14 computers are still based on the standard "QWERTY" key  
15 layout wherein the letter keys are enclosed by number and  
16 symbol keys across the top edge and command keys around  
17 the remaining edges. Typically, these keyboards are  
18 designed to be used on a desktop and so limit the true  
19 portability of these devices. Those keyboards that are  
20 designed to be hand held are typically limited to use  
21 with only the thumbs of an operator.

22

1 The main restriction on the continued miniaturisation of  
2 these keyboards is the fact that keyboard operator's  
3 fingers can not themselves be miniaturised. Therefore,  
4 although electronic components continue to get smaller  
5 the advantage of this increased miniaturised can not be  
6 fully exploited by the present keyboard designs. Present  
7 keyboard designs are also the main limiting factor in the  
8 continued miniaturisation of mobile phones.

9

10 Furthermore, the design of keyboards employed for  
11 portable computers, mobile phones and electronic games  
12 controllers have each evolved separately resulting in  
13 their own data input and control devices that require  
14 different operating skills by the user. Current attempts  
15 to integrate one or more of these keyboard designs have  
16 resulted in keyboards that are clumsy and so inefficient  
17 for operators to use.

18

19 It is an object of an aspect of the present invention to  
20 provide a keyboard design that provides good  
21 miniaturisation capabilities while allowing for efficient  
22 use by a keyboard operator.

23

24 A further object of an aspect of the present invention is  
25 to provide a keyboard design that provides good  
26 miniaturisation capabilities and so allows for the  
27 integration of the functionality of a standard computer  
28 keyboard, a mobile phone and an electronic games  
29 controller.

30

31 According to a first aspect of the present invention  
32 there is provided a keyboard for use by an operator  
33 comprising a first keyboard section containing a

1 plurality of character input keys, a first edge that is  
2 located adjacent to the operator during normal use of the  
3 keyboard and a second keyboard section containing a  
4 plurality of command input keys wherein the second  
5 keyboard section is located between the first keyboard  
6 section and the first edge and is displaced from the  
7 first keyboard section.

8

9 Preferably the plurality of character input keys comprise  
10 keys for inputting printable characters selected from the  
11 group comprising alpha numeric, symbols and punctuation  
12 characters.

13

14 Preferably the plurality of command input keys comprise  
15 keys for inputting commands selected from the group  
16 comprising tab, capitals lock, numbers lock, shift,  
17 control, alt, back space, insert, delete, home, end, page  
18 up, page down, mouse control, escape, and function keys.

19

20 Preferably the keyboard further comprises connection  
21 means for connecting the keyboard to a remote computer  
22 system. Optionally the connection means comprises a  
23 signal transmitter.

24

25 Most preferably the first keyboard section and the second  
26 keyboard section are pivotally attached so that the  
27 second keyboard section can be moved from the displaced  
28 position to a second position located below the first  
29 keyboard section.

30

31 Optionally, when the second keyboard section is moved to  
32 the second position the function of the command input  
33 keys are remapped so as to maintain the relative position

1 of the function of the command input keys to that  
2 provided in the displaced position.

3

4 Preferably the first keyboard section further comprises a  
5 multidirectional key and a mouse stick and the command  
6 input keys are mapped to provide a plurality of trigger  
7 buttons so enabling the keyboard to be employed as a  
8 games controller.

9

10 Preferably the first and second keyboard sections  
11 comprise side cut recesses.

12

13 Preferably the first keyboard section comprises a  
14 representation of the configuration of the function of  
15 the command input keys when the second keyboard section  
16 is located in the second position.

17

18 Optionally when the second keyboard section is moved to  
19 the second position the first keyboard section is  
20 deactivated.

21

22 Optionally when the second keyboard section is moved to  
23 the second position the keyboard functions as a remote  
24 control device. Alternatively the second keyboard  
25 section comprises a mobile phone screen such that when  
26 the second keyboard section is moved to the second  
27 position the keyboard functions as a mobile phone.

28

29 Optionally the keyboard further comprises a main screen.

30

31 Preferably the main screen is pivotally attached to the  
32 first keyboard section so that it moves between a first

1 position where the main screen can be viewed and a second  
2 position where the main screen can not be viewed.

3

4 Most preferably when the main screen is the second  
5 position it provides a physical barrier to the character  
6 input keys.

7

8 Preferably the keyboard is made of a plastic material.

9

10 Preferably the character input keys and the command keys  
11 comprise keys that are ergonomically optimised.

12

13 Aspects and advantages of the present invention will  
14 become apparent upon reading the following detailed  
15 description and upon reference to the following drawings  
16 in which:

17

18 Figure 1 presents a schematic representation of a  
19 keyboard in accordance with an aspect of the  
20 present invention;

21

22 Figure 2 presents a schematic representation of an  
23 operator's finger positions employed with the  
24 keyboard of Figure 1;

25

26 Figure 3 presents a side elevation of the keyboard of  
27 Figure 1 when arranged in a:

- 28 a) Open, desktop configuration;
- 29 b) Closed, hand-held configuration; and
- 30 c) Closed, hand-held configuration with a  
31 main screen also in a closed position;

32

1 Figure 4 presents a schematic representation of an  
2 operator's finger positions when the keyboard  
3 is employed in the closed, hand-held  
4 configuration of Figure 3(b);

5

6 Figure 5 presents a schematic representation of an  
7 operator's finger positions when the keyboard  
8 is employed in the closed, configuration of  
9 Figure 3(b) as a games controller.

10

11 Referring to Figure 1 a schematic representation of a  
12 keyboard 1 in accordance with an aspect of the present  
13 invention is presented. The keyboard 1 can be seen to  
14 comprise a first keyboard section 2 and a second keyboard  
15 section 3 displaced from the first towards the normal  
16 operating position of a keyboard user. A connection  
17 means (not shown) allows the keyboard to be incorporated  
18 directly with any computer system, as and when required.  
19 The connection means can be in the form of hard wiring or  
20 alternatively via remote access by incorporating a signal  
21 transmitter (not shown) within the keyboard 1.

22

23 The first keyboard section 2 comprises character input  
24 keys 4, namely letter, number and symbol keys arranged in  
25 a standard "QWERTY" style layout. The second keyboard  
26 section 3 comprises the majority of the usual command  
27 input keys 5 found on a standard keyboard i.e. shift,  
28 control, alt, delete, insert, home, end, page up, page  
29 down, mouse control, and function keys.

30

31 Figure 2 presents a schematic representation of an  
32 operator's finger positions when the keyboard 1 is  
33 employed. As can be seen the first keyboard section 2 is

1 divided into regions for the operator's forefingers 6,  
2 middle fingers 7, ring and small fingers 8 while the  
3 second keyboard section 3 is divided into regions for use  
4 by the thumbs of an operator. In particular, the left  
5 thumb controls the keys within a left thumb region 9, the  
6 right thumb controls the keys within a right thumb region  
7 10 and either thumb controls the keys within the central  
8 thumb region 11.

9

10 The development of the second keyboard section 3 allows  
11 for the keyboard 1 to be miniaturised while maintaining  
12 efficiency of use by an operator when compared to those  
13 keyboard designs already known to those skilled in the  
14 art. In particular, the efficiency of use of the  
15 keyboard is maintained by the location of all of the  
16 command keys 5 within an area that can be easily accessed  
17 by the thumbs of the operator while the character input  
18 keys 4 still allow for eight finger touch typing.

19

20 It will be obvious to those skilled in the art that  
21 alternative key arrangements to the "QWERTY" style  
22 arrangement can also be employed within the first  
23 keyboard section 2. For example in an alternative  
24 embodiment (not shown) a "DVORAK" key arrangement is  
25 employed within the first keyboard section 2.

26

27 The design of the keyboard 1 can be further exploited so  
28 as to further increase the miniaturisation of the device  
29 and to allow increased functionality to be achieved by an  
30 operator. Referring to Figure 1 the keyboard 1 can be  
31 seen to further comprise a first hinge 12 located between  
32 the first 2 and second keyboard sections 3.

33

1 The first keyboard section can also be seen to further  
2 comprise a multidirectional key 13, a mouse stick 14 and  
3 four games control keys 15. The games control keys 15  
4 are simply letter keys 4 produced in different colours so  
5 as to allow them to be easily identified from the other  
6 letter keys 4 located on the first keyboard section 2.

7

8 Furthermore, the second keyboard sections 3 can be seen  
9 to further comprise a mobile phone screen 16. The  
10 command keys 5 of the second keyboard sections 3 can be  
11 mapped so as to function as a standard mobile phone  
12 keyboard, as a remote control device, or as the trigger  
13 buttons for a games controller, as explained in detail  
14 below.

15

16 From an analysis of Figure 3 the integrated nature of the  
17 keyboard 1 becomes readily apparent. Figure 3(a)  
18 presents a side elevation of the keyboard 1 of Figure 1  
19 in a fully expanded, desktop configuration.

20

21 Moving to Figure 3(b) the second keyboard section 3 has  
22 been pivoted about the first hinge 12 so that the second  
23 keyboard section 3 now locates below the first keyboard  
24 section 2. In this orientation the keys 4, 13, 14 and 5  
25 of both the first 2 and second keyboard sections 3 remain  
26 accessible to the operator. This configuration is  
27 referred to as the closed, hand-held configuration. In  
28 the closed, hand-held configuration the keyboard 1 is  
29 specifically designed to be held and operated by both  
30 hands, as detailed below, thus providing true portability  
31 during use, for example when employed on trains or  
32 planes. Indeed to aid in this process side cut recesses  
33 17 are located in the first 2 and second keyboard

1 sections 3 to aid gripping by the knuckles of the  
2 forefingers.

3

4 It should also be noted that when the second keyboard  
5 section 3 is located below the first keyboard section 2  
6 the functional layout of the command keys 5 is remapped.  
7 This is carried out in order to maintain the position of  
8 the command keys 5, and the relationship between them,  
9 with that provided when the keyboard 1 is in the desktop  
10 configuration. For example the "9" key on the second  
11 keyboard section 3 is ascribed the "Ctrl" function in the  
12 expanded, desktop configuration. However, in the closed,  
13 hand-held configuration the "Ctrl" function moves to the  
14 "7" key which now occupies that position. To aid  
15 location by an operator of the keyboard 2 in this  
16 configuration the layout of the command keys 5 on the  
17 second keyboard section 3 is reproduced in shadow form 18  
18 on the first keyboard section 2.

19

20 Figure 4 presents a schematic representation of an  
21 operator's finger positions when the keyboard 1 is  
22 employed in the closed, hand-held configuration of Figure  
23 3(b). As can be seen the operator's thumbs are employed  
24 to control the character input keys 4 on the first  
25 keyboard section 2. In particular the left thumb  
26 operates the keys within a left thumb region of the first  
27 keyboard section 19 while the right thumb operates the  
28 keys located within a right thumb region 20. Either  
29 thumb is then available to operate the keys within a  
30 middle region of the first keyboard section 21. The  
31 operator's forefingers, middle fingers, ring and/or small  
32 fingers then control the command keys 5 located within a

1 front region 22, a middle region 23 and a back region of  
2 the second keyboard section 24, respectively.

3

4 The keyboard 1 is capable of operating in different  
5 functional modes when in the closed, hand-held  
6 configuration. A "function" command key 5 is employed to  
7 toggle through the alternative functional modes.

8

9 A first functional mode corresponds to the keyboard 1  
10 being employed as a games controller. Referring to  
11 Figure 5 a schematic representation of an operator's  
12 finger positions when the keyboard 1 is employed in the  
13 closed configuration of Figure 3(b) as a games controller  
14 is presented. In this mode the mouse stick 14 acts as a  
15 joystick, which together with the multidirectional key 13  
16 and the game control keys 15 are operated by the thumbs  
17 of an operator. For this function the command keys 5 are  
18 mapped so as to provide trigger buttons 25 for the games  
19 controller. The trigger buttons 25 (Left 1 (L1), Left 2  
20 (L2), Right 1 (R1) and Right 2 (R2)) are activated by an  
21 operator by the use of their forefingers and the ring  
22 fingers accessing the second keyboard section 3, as  
23 appropriate. As a result when employed as a games  
24 controller the keyboard 1 allows for multi-finger play by  
25 an operator.

26

27 The second and third functional modes can be considered  
28 as single hand modes of operation and correspond to the  
29 keyboard 1 functioning as a mobile phone and a remote  
30 control device, respectively. When in these modes of  
31 operation the first keyboard section 2 is redundant and  
32 so rendered inactive. In the mobile phone mode the  
33 second keyboard section 3 is mapped so that the keyboard

1 1 replicates the function of a mobile phone keyboard.  
2 Similarly, in the remote control device mode the second  
3 keyboard section 3 is mapped so that the keyboard 1  
4 operates as a remote control keyboard for the remote  
5 control of a domestic appliance e.g. television, stereos,  
6 video player, DVD player etc.

7

8 Figure 1 and 3 presents a further alternative embodiment  
9 of the keyboard 1 where it comprises a main screen 26.  
10 The main screen 26 is attached to the first keyboard  
11 section 2 by a second hinge 27. In this embodiment the  
12 main screen 26 pivots about the second hinge 27 so that  
13 it moves between a first position, where the main screen  
14 26 can be easily viewed (see Figures 1, 3(a) and 3(b))  
15 and a second position where the screen 26 can not be  
16 viewed, Figure 3(c). In particular when located in the  
17 second position the rear area of the screen 26 section  
18 provides a physical barrier for an operator to the keys  
19 4, 13 and 14 of the first keyboard section 2.  
20 Furthermore, when moved to the closed position the main  
21 screen can be used to deactivate the first keyboard  
22 section. At this stage only the single hand modes of  
23 operation, namely the mobile phone mode and the remote  
24 control device mode are available for selection.

25

26 The keyboard 1 is made of a plastic material so as to  
27 allow for ease of manufacture and the ability to utilise  
28 colours to facilitate identification of the keys 4, 13,  
29 14 and 5 and their function. The keys 4, 13, 14 and 5  
30 are also shaped to optimise ergonomics in terms of the  
31 fingers used to operate them. For example "petal" shaped  
32 command keys 5 are employed on the second keyboard  
33 section 3. Furthermore, the casing of the keyboard 1 can

1 further comprise protrusions (not shown) located around  
2 the keys 4, 13, 14 and 5 so as to aid the location of an  
3 operator's finger to the keys 4, 13, 14 and 5.

4

5 Aspects of the present invention have a number of  
6 advantages over those keyboards described in the prior  
7 art. In the first instance the two keyboard section  
8 design provides a means for miniaturising keyboards  
9 whilst still allowing for an acceptable degree of  
10 efficiency of use by an operator i.e. still allowing for  
11 eight finger touch typing. This is achieved because the  
12 keyboard design moves the constraint on miniaturisation  
13 from being one of human anatomy to be one of hardware  
14 development.

15

16 Additional miniaturisation is also achieved through the  
17 introduction of hinges that allow the component sections  
18 to pivot relative to each other. These features provide  
19 the additional advantage that they allow for the keyboard  
20 to be configured for use as a desktop keyboard or as a  
21 hand held keyboard. The hand-held configuration is  
22 designed specifically to be held, and operated, by both  
23 hands so allowing for true portability of the keyboard.  
24 In the hand-held configuration the keyboard can be  
25 selected to operate as a games controller, as a mobile  
26 phone or as a remote control device.

27

28 It should be noted that all of the available keyboard  
29 modes can be obtained within a platform that is sized  
30 with a standard mobile phone. By allowing the majority  
31 of the keys to provide multiple functions there is a  
32 significant reduction in the overall number of keys  
33 required by the keyboard.

1  
2 The foregoing description of the invention has been  
3 presented for purposes of illustration and description  
4 and is not intended to be exhaustive or to limit the  
5 invention to the precise form disclosed. The described  
6 embodiments were chosen and described in order to best  
7 explain the principles of the invention and its practical  
8 application to thereby enable others skilled in the art  
9 to best utilise the invention in various embodiments and  
10 with various modifications as are suited to the  
11 particular use contemplated. Therefore, further  
12 modifications or improvements may be incorporated without  
13 departing from the scope of the invention as defined by  
14 the appended claims.

1 **CLAIMS**

2

3 1) A keyboard (1) for use by an operator comprising a  
4 first keyboard section (2) containing a plurality of  
5 character input keys (4), a first edge that is  
6 located adjacent to the operator during normal use of  
7 the keyboard and a second keyboard section (3) containing a plurality of command input keys (5)  
8 wherein the second keyboard section (3) is located  
9 between the first keyboard section (2) and the first  
10 edge and is displaced from the first keyboard section  
11 (2).

12

13

14 2) A keyboard (1) as claimed in Claim 1 wherein the  
15 plurality of character input keys (4) comprise keys  
16 for inputting printable characters selected from the  
17 group comprising alpha numeric, symbols and  
18 punctuation characters.

19

20 3) A keyboard (1) as claimed in Claim 1 or Claim 2  
21 wherein the plurality of command input keys (5) comprise keys for inputting commands selected from  
22 the group comprising tab, capitals lock, numbers  
23 lock, shift, control, alt, back space, insert,  
24 delete, home, end, page up, page down, mouse control,  
25 escape, and function keys.

26

27

28 4) A keyboard (1) as claimed in any of the preceding  
29 Claims wherein the keyboard (1) further comprises  
30 connection means for connecting the keyboard (1) to a  
31 remote computer system.

32

1 5) A keyboard (1) as claimed in Claim 4 wherein the  
2 connection means comprises a signal transmitter.

3

4 6) A keyboard (1) as claimed in any of the preceding  
5 Claims wherein the first keyboard section (2) and the  
6 second keyboard section (3) are pivotally attached so  
7 that the second keyboard section (3) can be moved  
8 from the displaced position to a second position  
9 located below the first keyboard section (2).

10

11 7) A keyboard (1) as claimed in Claim 6 wherein when the  
12 second keyboard section (3) is moved to the second  
13 position the function of the command input keys (5)  
14 are remapped so as to maintain the relative position  
15 of the function of the command input keys (5) to that  
16 provided in the displaced position.

17

18 8) A keyboard (1) as claimed in Claim 6 wherein the  
19 first keyboard section further comprises a  
20 multidirectional key and a mouse stick and the  
21 command input keys are mapped to provide a plurality  
22 of trigger buttons so enabling the keyboard to be  
23 employed as a games controller.

24

25 9) A keyboard (1) as claimed in any of the preceding  
26 Claims wherein the first (2) and second keyboard  
27 sections (3) comprise side cut recesses (17).

28

29 10) A keyboard (1) as claimed in Claims 6 to 9 wherein  
30 the first keyboard section (2) comprises a  
31 representation (18) of the configuration of the  
32 function of the command input keys (5) when the

1 second keyboard section (3) is located in the second  
2 position.

3

4 11) A keyboard (1) as claimed in Claims 6 to 10 wherein  
5 when the second keyboard section (3) is moved to the  
6 second position the first keyboard section (2) is  
7 deactivated.

8

9 12) A keyboard (1) as claimed in Claims 6 to 11 wherein  
10 the second keyboard section (3) functions as a remote  
11 control device.

12

13 13) A keyboard (1) as claimed in Claims 6 to 11 wherein  
14 the second keyboard section (3) comprises a mobile  
15 phone screen such that the second keyboard section  
16 (3) functions as a mobile phone.

17

18 14) A keyboard (1) as claimed in any of the preceding  
19 Claims wherein the keyboard (1) further comprises a  
20 main screen (26).

21

22 15) A keyboard (1) as claimed in Claim 14 wherein the  
23 main screen (26) is pivotally attached to the first  
24 keyboard section (2) so that it moves between a first  
25 position where the main screen (26) can be viewed and  
26 a second position where the main screen (26) can not  
be viewed.

28

29 16) A keyboard (1) as claimed in Claim 15 wherein when  
30 the main screen (26) is the second position it  
31 provides a physical barrier to the character input  
32 keys (4).

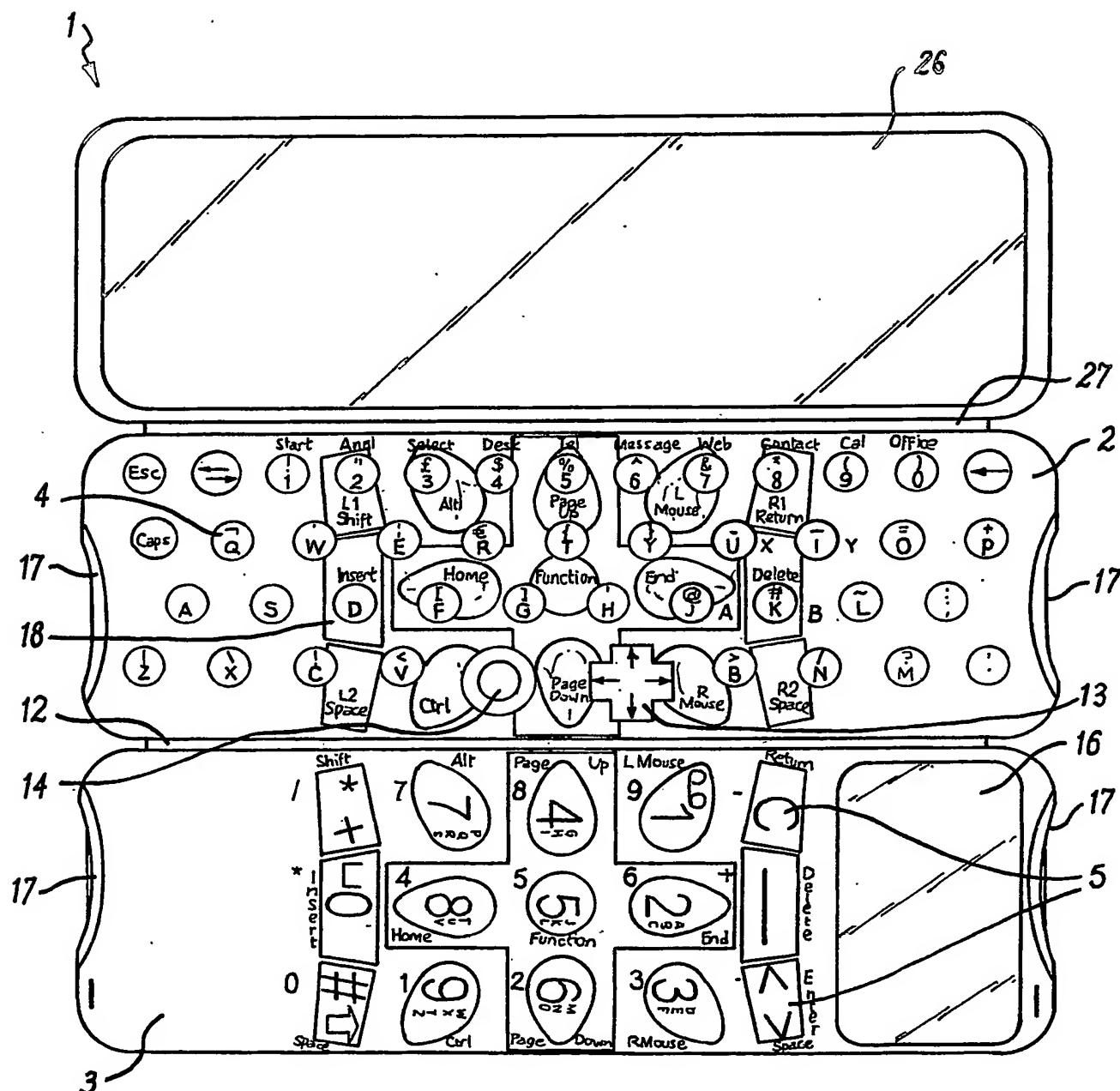
33

1 17) A keyboard (1) as claimed in any of the preceding  
2 Claims wherein the keyboard (1) is made of a plastic  
3 material.

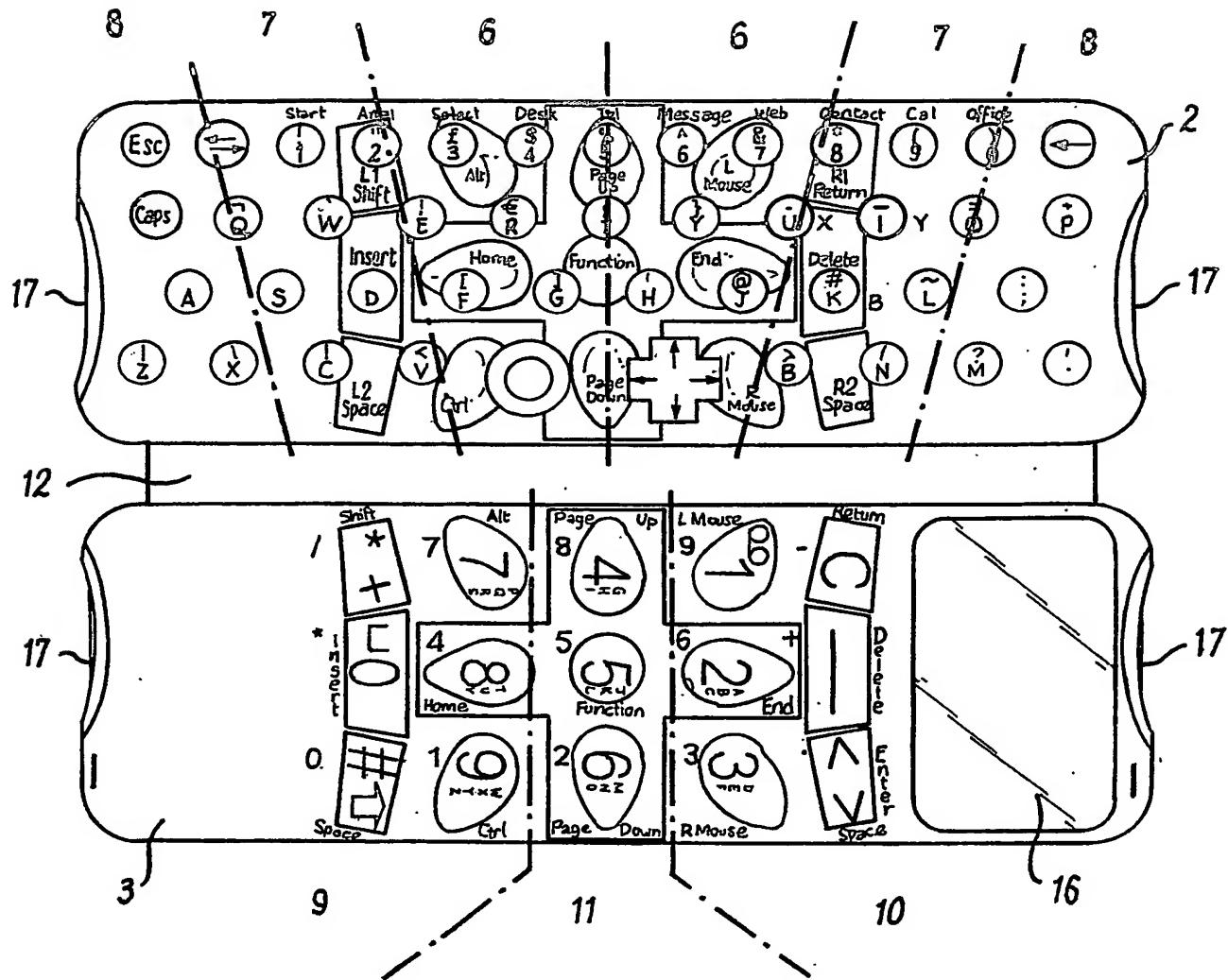
4

5 18) A keyboard (1) as claimed in any of the preceding  
6 Claims wherein the character input keys (4) and the  
7 command keys (5) comprise keys that are ergonomically  
8 optimised.

9



**Feb. 1**

**FIG. 2**

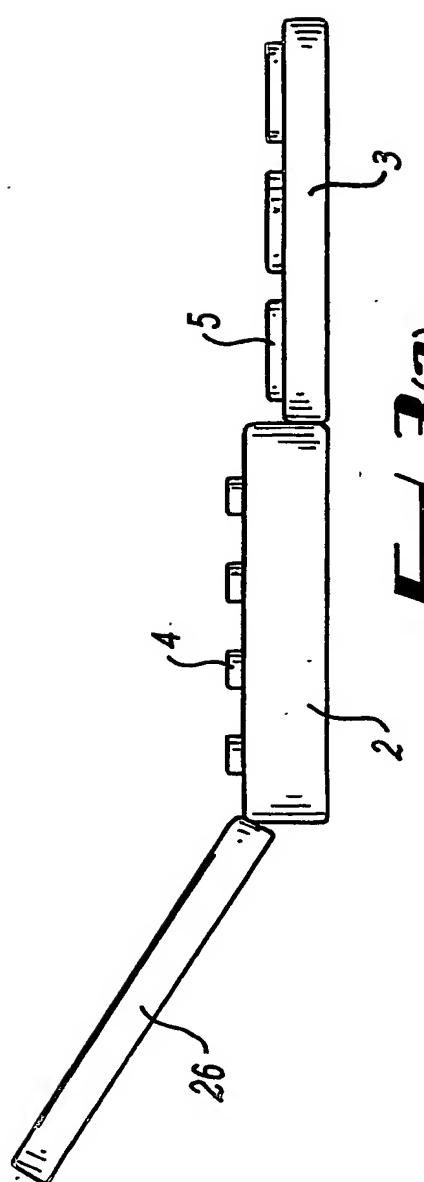


FIG. 3(a)

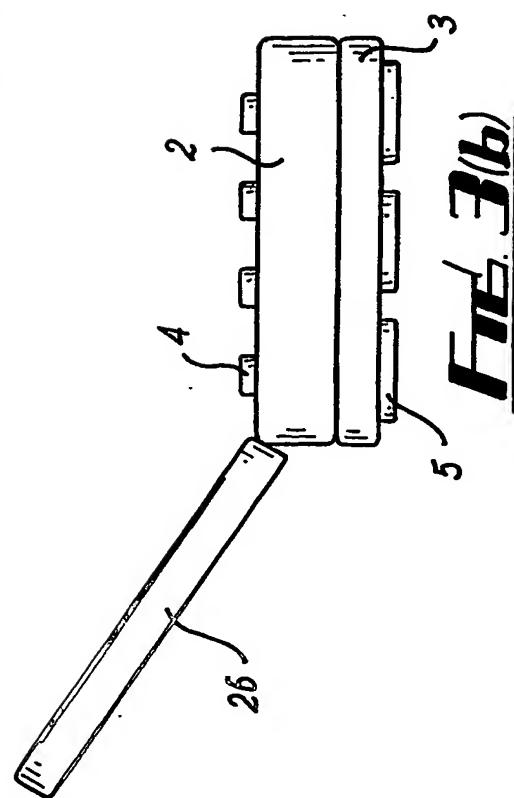


FIG. 3(b)

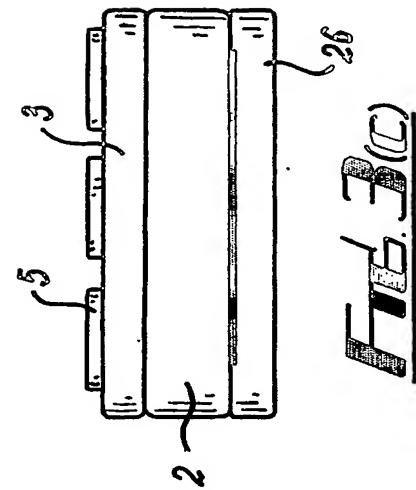


FIG. 3(c)

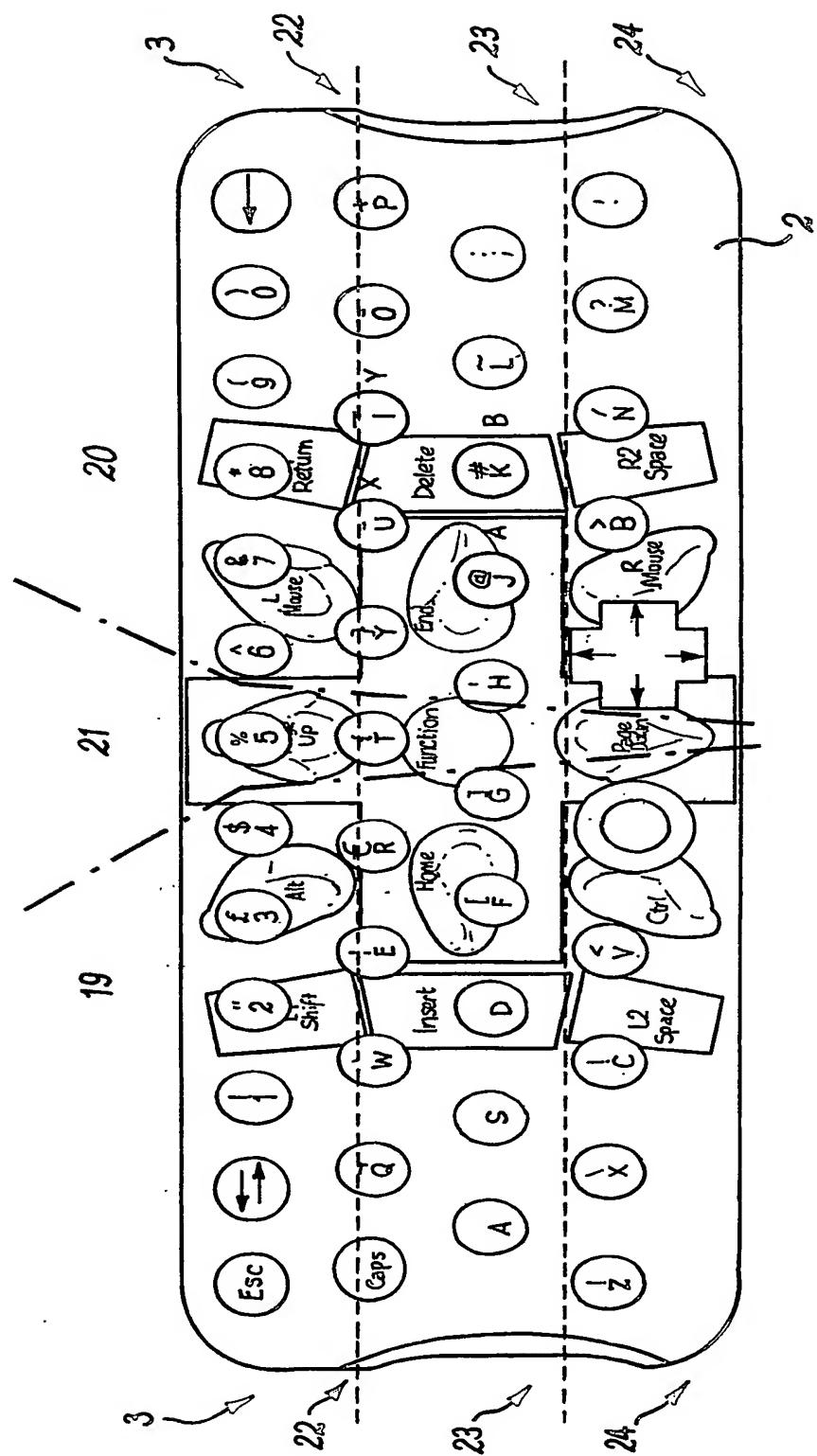


FIG. 4

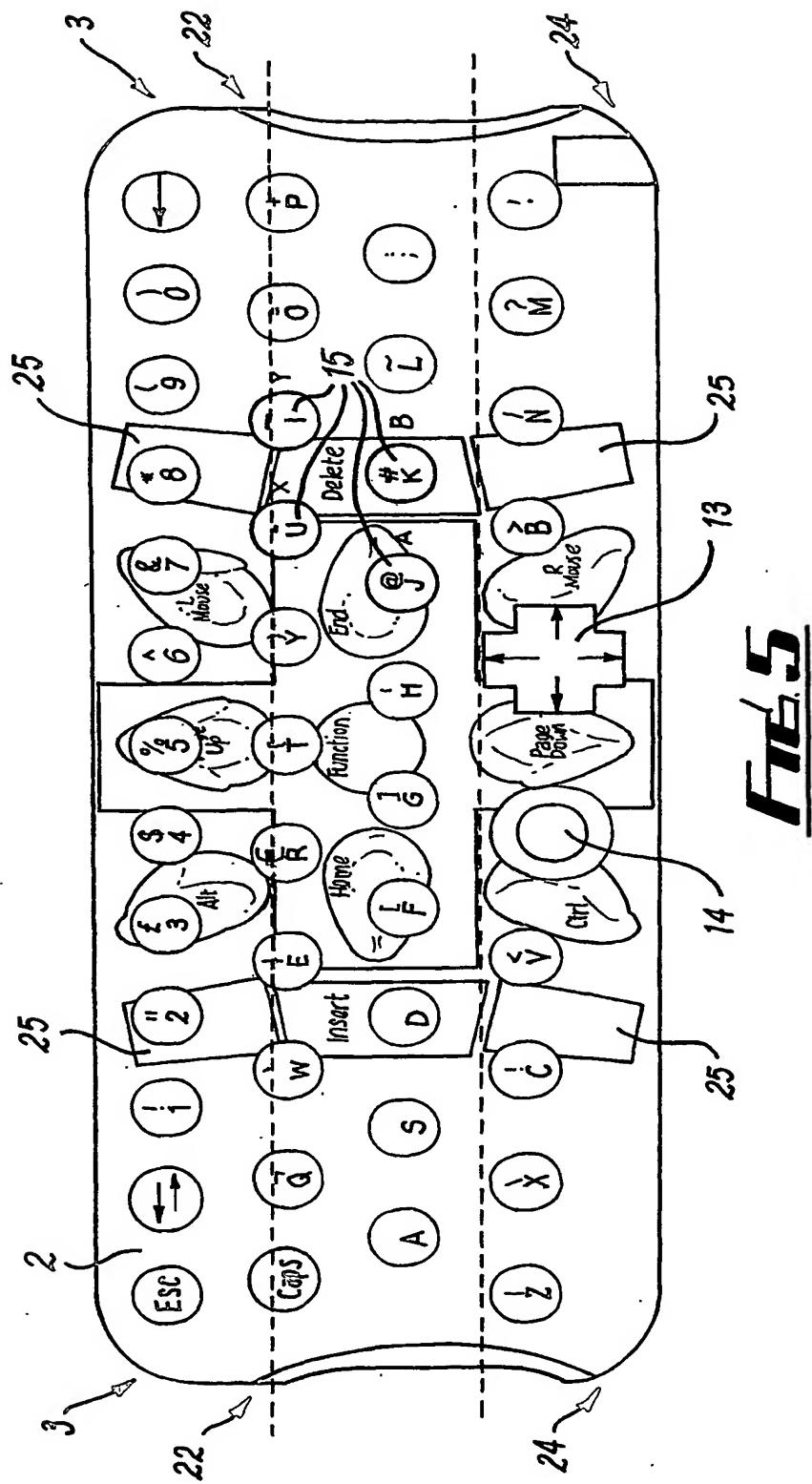


Fig. 5

## INTERNATIONAL SEARCH REPORT

Ir Application No  
PCT/EP2004/001138A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G06F1/16 G06F3/02 H04M1/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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30 July 2004

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